First Electricity Generation Stakeholder Meeting Summary
November 9, 1999

Arlington, Virginia

Opening Comments

The first meeting of the Electricity Generation Stakeholder Group was held on November 9, 1999 at the Holiday Inn National Airport Crystal City in Arlington, Virginia. There were 29 individuals that attended the meeting: 22 Stakeholders, four Center staff, two EPA staff, and one ETV program monitor. A list of the Stakeholder members that attended is included in Attachment A.

Morning Session

The meeting started with Stephen Piccot offering welcoming remarks and a summary of the meetings goals and agenda. The primary goal identified was to obtain input and guidance from the stakeholder group on (1) which specific technologies the Center should focus verification efforts on, and (2) what verification strategies and parameters are of most interest.

After the introductory remarks, each of the meeting participants was asked to introduce themselves and describe their interest in participating in the meeting. This process required about 30 minutes to complete. Following this, Stephen Piccot made a formal presentation that described the ETV Program, outlined the goals and focus of the Greenhouse Gas Technology Verification Center, and described the Center's verification process.

After a brief break, three technology area-specific presentations were made to provide background and food for thought for the afternoon open discussion sessions. The technology area presenters and their topics were:

- Joe Iannucci, Distributed Utility Associates Distributed Generation Technologies
- Tod Rittenhouse, ABB Power T&D Company Sulfur Hexafluoride Monitoring and Mitigation
- Sushma Masemore, Southern Research Institute Waste Methane Utilization

After the technical presentations above, a group lunch was provided.

Afternoon Session

Following lunch, a brainstorming session was held to develop a list of specific technologies the Center should pursue as verification candidates. As a starting point, the Center presented a list of specific technologies in the three technology areas listed above. Stakeholder members then added technologies to these lists including biomass co-firing, fuel reformers, energy efficiency improvements, various fuel/combustion combinations, a waste disposal technology, hybrid distributed generation systems, and other retrofit co-firing technologies.

After the lists of technologies were complete, the group voted on technologies in response to four questions posed by the meeting facilitator, Brian Phillips. These questions were intended to identify which listed technologies were in use now, planned for use in the near-term, and planned for use in the long-term (of strategic interest). A final question was intended to identify which technologies were best candidates for verification, according to the stakeholders.

After the voting, several participants expressed concern that the questions were not clear and the results may be biased. Following the meeting, the Center e-mailed clarified instructions and a request that each member vote again on the technology lists. Included with this request were the voting results obtained at the meeting (see Attachment B). Only four stakeholders responded with new voting results, and as explained in the voting instructions, the original voting results would be used if the response to the second vote was too low.

The original voting results were developed by adding together, for each individual technology, the votes cast in response to all of the four questions. The top rated technologies, and the number of votes each received, are listed below. The seven technologies below received from 12 to 23 total votes, while the remaining technologies had between 0 and 9 total votes each. For a more complete explanation of how the votes were counted, see Attachment B.

1. Microturbines (23): gas and diesel
2. PEM Fuel Cells (21): gas and dual fuel
3. Energy Efficiency Improvements (16): no fuel data
4. Small Industrial Turbines (13): gas and diesel
5. Hybrid DG Systems – Fully Integrated (13): no fuel data
6. Reciprocating Engines (12): diesel and gas
7. Fuel Reformers (12): no fuel data

The list above is considered representative of the group's priority listing of technologies. It is also considered to represent where the group feels third-party performance verification would be useful. Although only a few members participated in the second vote, most of the best verification candidates identified by those members are included on the list above. The only exception is Stirling Engines, which was moderately rated at the

meeting. Stirling engines will be considered an important technology as the Center pursues verification opportunities.

Technologies in other areas of interest (SF6 technologies, landfill gas technologies, manure management technologies) had fewer votes than those listed above. However, laser-based SF6 detection technologies, and landfill gas recovery and energy production technologies received a significant number of votes (10 each) and will be pursued along with the 7 distributed generation technologies listed above.

After the technology voting, a second brainstorming/voting session was held to identify verification parameters of most interest to the group. This was accomplished by first asking the group to develop a list of verification parameters, then calling for a vote to prioritize the list. The results of this effort are shown below, and are explained in more detail in Attachment B.

1. Emission Reduction (10)
2. Total Life Cycle Cost (10)
3. GHG Emission Rates (8)
4. Criteria Pollutant Emission Rates (6)
5. Energy Conversion Efficiency – ISO (6)
6. Power Quality – Grid Parallel (6)
7. Reliability (6)

The meeting adjourned at 4:15pm, immediately following a wrap-up session conducted by Stephen Piccot. During the wrap-up, Mr. Piccot summarized the voting results, notified the group that a second technology vote would be held, and highlighted any other major guidance provided by the stakeholders. It was noted that several stakeholders cautioned the Center not to over commit to conducting comprehensive verification activities (e.g., don't try and evaluate all 7 parameters for every technology evaluated).

Attachment A

Stakeholder Members in Attendance

First Name	Last Name	Company
Doug	Boylan	Southern Company
Eric	Dolin	USEPA
Kevin	Duggan	Capstone Turbine Corporation
Joe	Iannucci	Distributed Utility Associates
Peter	Johnston	Arizona Public Service
Marshall	Kaiser	Safe Harborv

Wayne	Lei	Portland General Electric
Michael	Marvin	Business Council for Sustainable Energy
Morna	McGann	Energy Partners
Sarah	McKinley	Distributed Power Coalition of America
Patrick	McLafferty	Nextek
Anda	Ray	Tennessee Valley Authority
Rhone	Resch	Natural Gas Supply Association
Todd	Rittenhouse	ABB Power T&D Company
Mike	Siefert	Vero Beach Municipal Utilities
Brian	Shannon	ARCO Technology
Charles	Underhill	Vermont Public Power
Greg	Vogt	Eastern Power
Allan	Weatherford	Enron Gas Pipeline Group
Richard	Whittemore	Taunton Municipal Light
George	Wolff	Consolidated Edison Co. of NY
Diane	Wood	AlliedSignal Power Systems, Inc.

Attachment B

Voting Results From The Meeting

Technology-Focused Voting Results

We compiled the technology-focused voting results from our November meeting. Due to the confusion some members experienced during the technology voting, all red, green, yellow, and blue dots were summed for each specific technology to yield a total vote for that technology. We then identified the top rated technologies in each of the technology areas examined at the meeting. The technology area-specific results are described below. If we do not receive an adequate number of responses to the new voting, we plan to use the technology ranking below.

Distributed Generation

The top vote receivers are listed below in rank order, along with the number of total votes counted. Where possible, we also tried to match technologies with the most highly

rated fuel/technology combinations identified by the group. The seven technologies below received from 12 to 23 total votes, while the remaining technologies on the list developed at the meeting had between 0 and 9 total votes each.

1. Microturbines (23): gas and diesel
2. PEM Fuel Cells (21): gas and dual fuel
3. Energy Efficiency Improvements (16): no fuel data
4. Small Industrial Turbines (13): gas and diesel
5. Hybrid Systems – Fully Integrated (13): no fuel data
6. Reciprocating Engines (12): diesel and gas
7. Fuel Reformers (12): no fuel data

As it turns out, the same technology listing occurs when voting results are compiled for each individual color. This suggests that the same technology priorities apply to the four questions we posed at the meeting: which do you use now, which are of near-term interest, which are of long-term interest, and which need verification. Based on our limited exposure to DG, this generally represents where interest in distributed power exists.

SF6 Technologies

The top vote receivers are listed below in rank order, along with the number of total votes counted. The three technologies below received from 8 to10 total votes, while the remaining technologies on the list developed at the meeting had between 0 and 4 total votes each.

1. Laser Systems (10)
2. Gas Recovery/Recycling Carts (9)
3. On-Site SF6 Testing (8)

This was not as highly rated as DG technologies, because a comparatively low number of individuals with SF6 interests attended the meeting. Nevertheless, several technologies did garner a significant number of votes. As was the case for distributed generation, the same technology listing occurs when voting results are compiled for each individual color.

Landfill Technologies

The top vote receivers are listed below in rank order, along with the number of total votes counted. The three technologies below received from 6 to10 total votes, while the remaining technologies on the list developed at the meeting had between 2 and 3 total votes each. In the fuel-specific rankings, use of landfill gas as a fuel for combustion turbines, fuel cells, reciprocating engines, and Stirling Engines garnered a total of 14 votes.

1. Gas recovery and energy production (10)
2. Gas recovery and destruction (6)
3. Enhanced biogas & energy production (6)

As was the case for distributed generation, the same technology listing occurs when voting results are complied for each individual color.

Livestock/Manure

Very low interest was expressed in this technology area. As a result, the voting was not repeated.

Other Technologies

Several technologies were added to the list of technologies presented for voting, that were not categorized into the existing areas above. The top vote receivers are listed below in rank order, along with the number of total votes counted.

1. Retrofit Existing Co-firing Technologies (7)
2. Biomass Co-firing (6)

As was the case for distributed generation, the same technology listing occurs when voting results are compiled for each individual color.

Voting Results for Verification Parameters

The group listed a total of 23 individual verification parameters, and voting was done separately by vendors (red dots) and "users" (green dots). To examine overall interest, the red and green votes were summed. Because we can not afford to examine all parameters, only the highest rated parameters identified by the group are listed below, along with the number of total votes cast for each.

1. Emission Reduction (10)
2. Total Life Cycle Cost (10)
3. GHG Emissions (8)
4. Criteria Pollutant Emissions (6)
5. Energy Conversion Efficiency – ISO (6)
6. Power Quality – Grid Parallel (6)
7. Reliability (6)

The parameters above received from 6 to10 total votes each, while the remaining parameters had between 0 to 4 total votes each. Interestingly, both users and vendors rated the first two parameters as most important. Although slightly different priorities were assigned to the remaining parameters, both users and vendors top picks are represented in the listing above. The one exception was Power Quality – Stand Alone, which was rated moderately high by the vendors and low by the users.